OIPE
JUN 16 2005
PATENT & TRADEMARK OFFICE

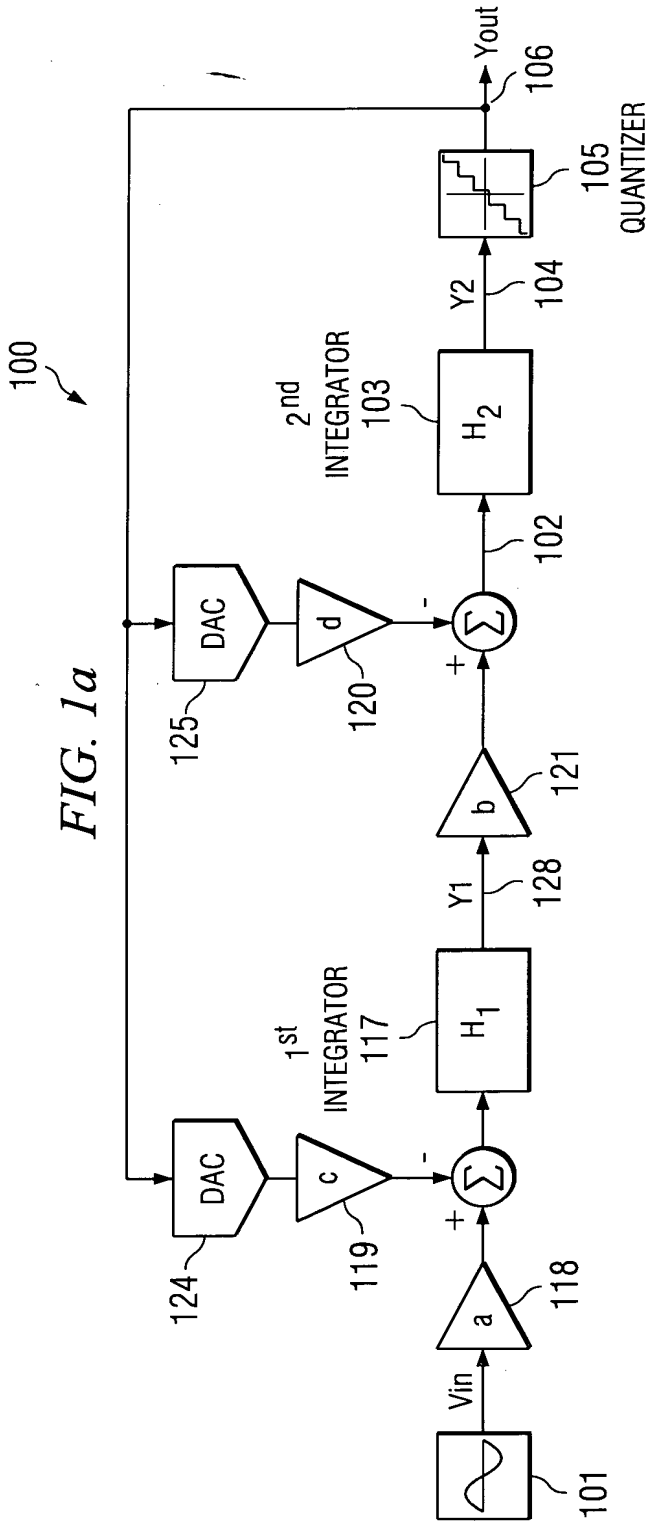


FIG. 1a

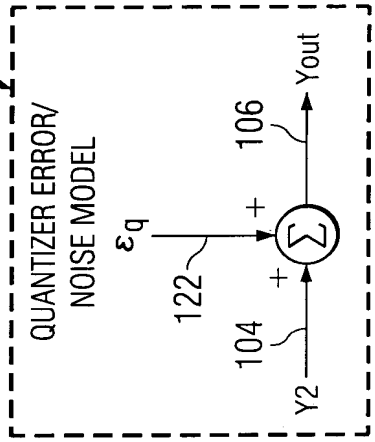


FIG. 1b

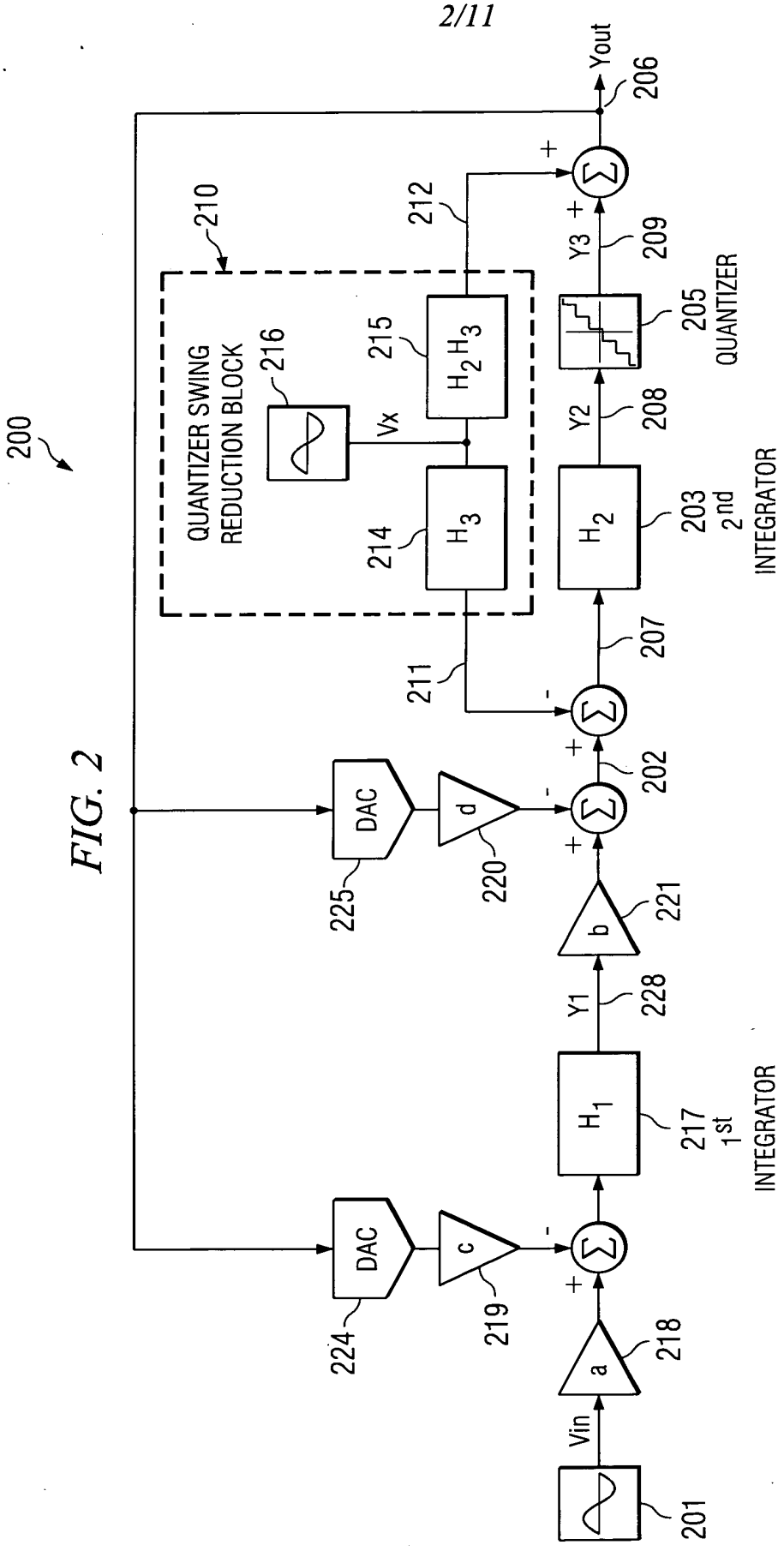

200
Vin
201
a
218
b
221
c
219
d
220
DAC
224
DAC
225
H1
217
1st
INTEGRATOR
Y1
228
H2
203
2nd
INTEGRATOR
Y2
208
H3
214
H2H3
215
Vx
216
QUANTIZER SWING
REDUCTION BLOCK
210
211
212
207
202
Y3
209
205
QUANTIZER
Yout
206

FIG. 2

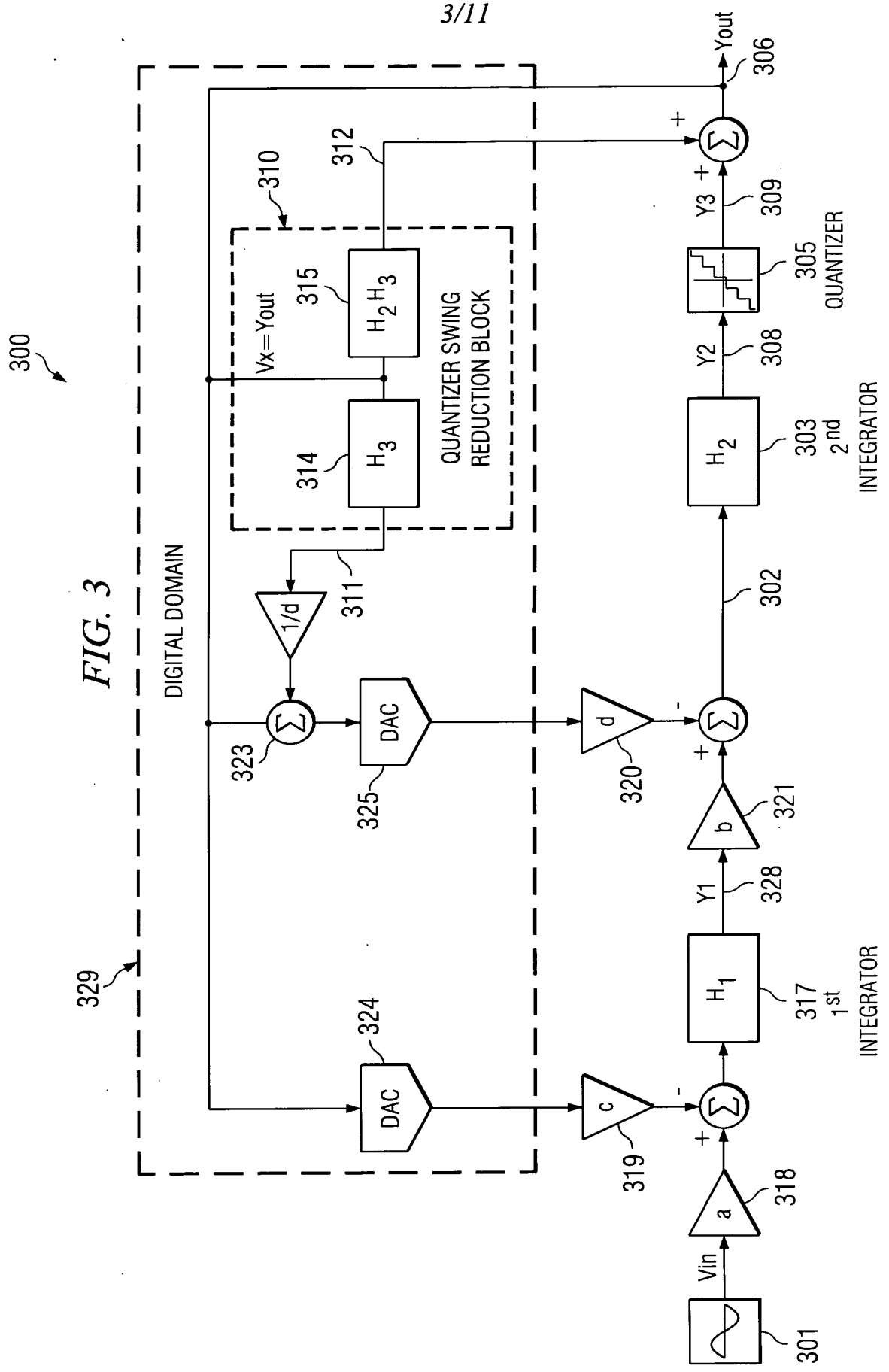

300
329
DIGITAL DOMAIN
310
QUANTIZER SWING REDUCTION BLOCK
Vx=Yout
315
H_2H_3
314
H_3
311
1/d
323
DAC
325
324
DAC
312
Yout
306
+
Y3
309
305
QUANTIZER
Y2
308
303
2nd INTEGRATOR
H_2
302
d
320
b
321
Y1
328
H_1
317
1st INTEGRATOR
c
319
a
318
Vin
301

FIG. 3

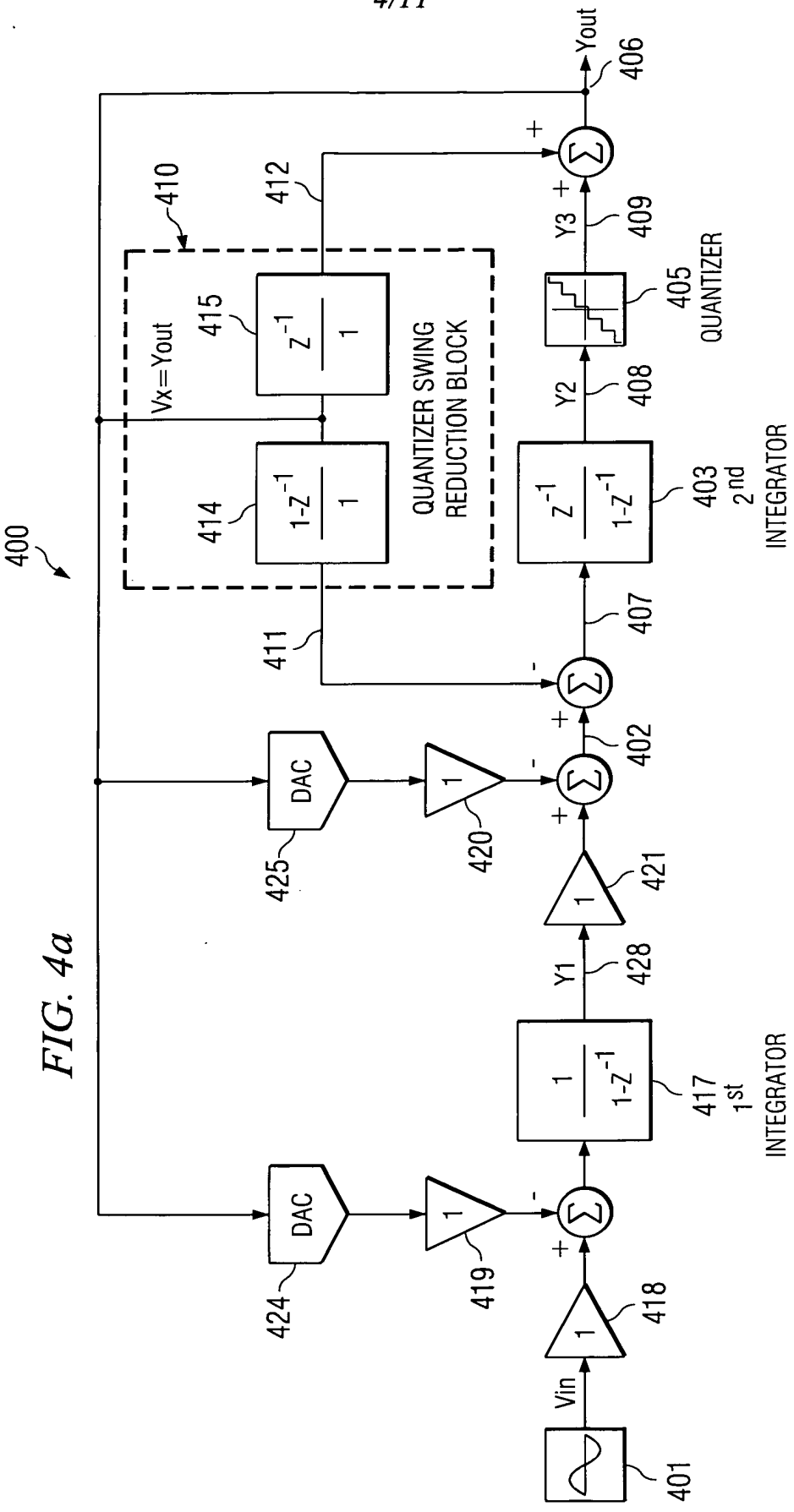

400
401
Vin
1
418
DAC
424
1
419
1
1-Z-1
417
1st INTEGRATOR
Y1
428
1
421
DAC
425
1
420
402
411
QUANTIZER SWING REDUCTION BLOCK
410
Vx=Yout
415
Z-1
1
414
1-Z-1
1
412
407
Z-1
1-Z-1
403
2nd INTEGRATOR
Y2
408
405
QUANTIZER
Y3
409
Yout
406

FIG. 4a

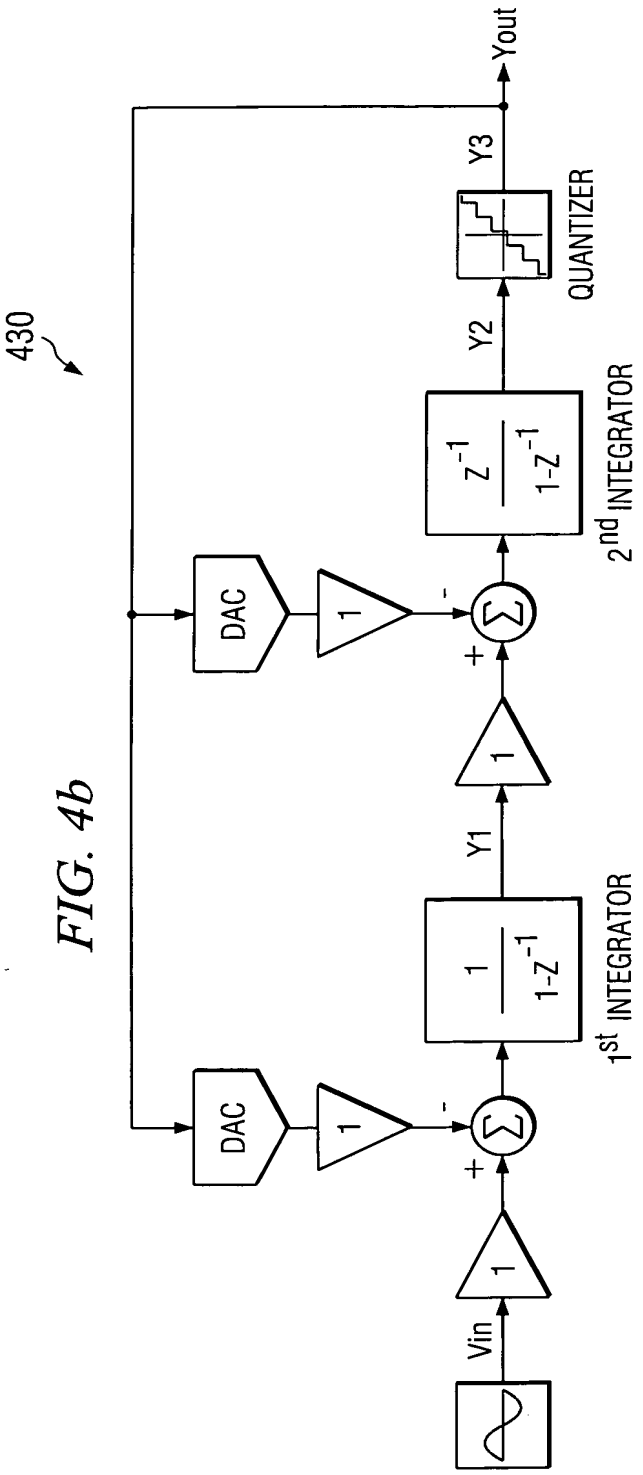

430
Vin
1
DAC
1
DAC
1
1
1-Z-1
1st INTEGRATOR
Y1
1
Z-1
1-Z-1
2nd INTEGRATOR
Y2
QUANTIZER
Y3
Yout

FIG. 4b

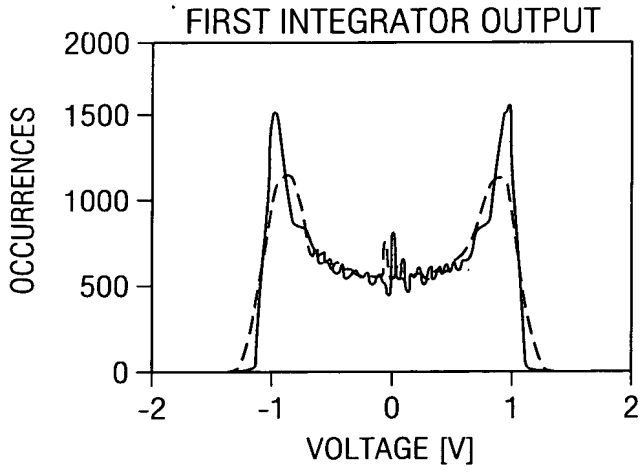


FIG. 5a

WITH QUANTIZER SWING REDUCTION SCHEME

WITHOUT QUANTIZER SWING REDUCTION SCHEME

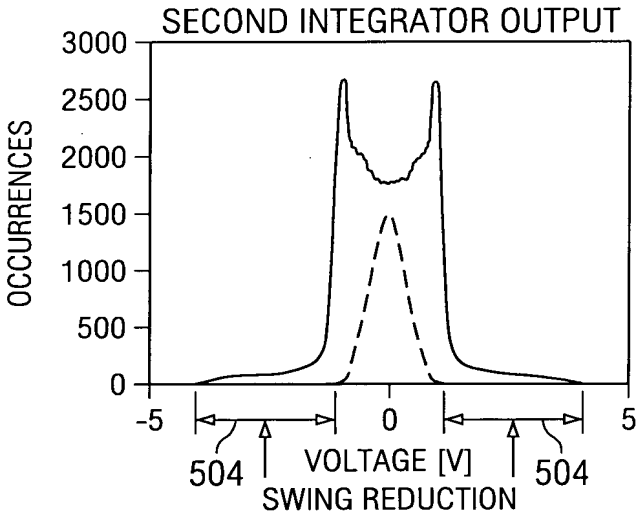


FIG. 5b

WITH QUANTIZER SWING REDUCTION SCHEME

WITHOUT QUANTIZER SWING REDUCTION SCHEME

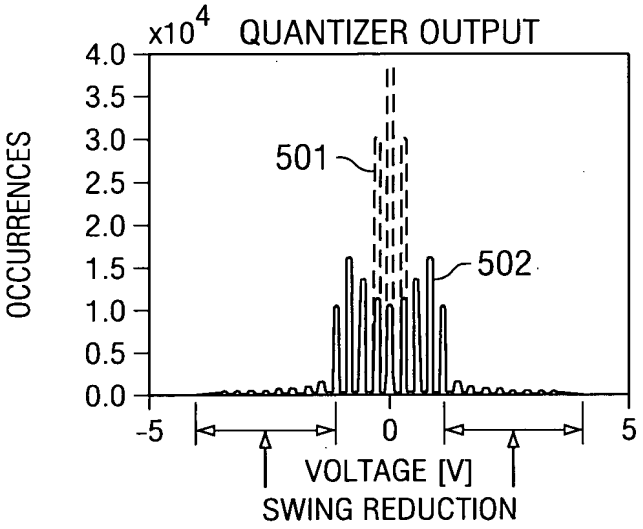


FIG. 5c

WITH QUANTIZER SWING REDUCTION SCHEME

WITHOUT QUANTIZER SWING REDUCTION SCHEME

FIG. 5d

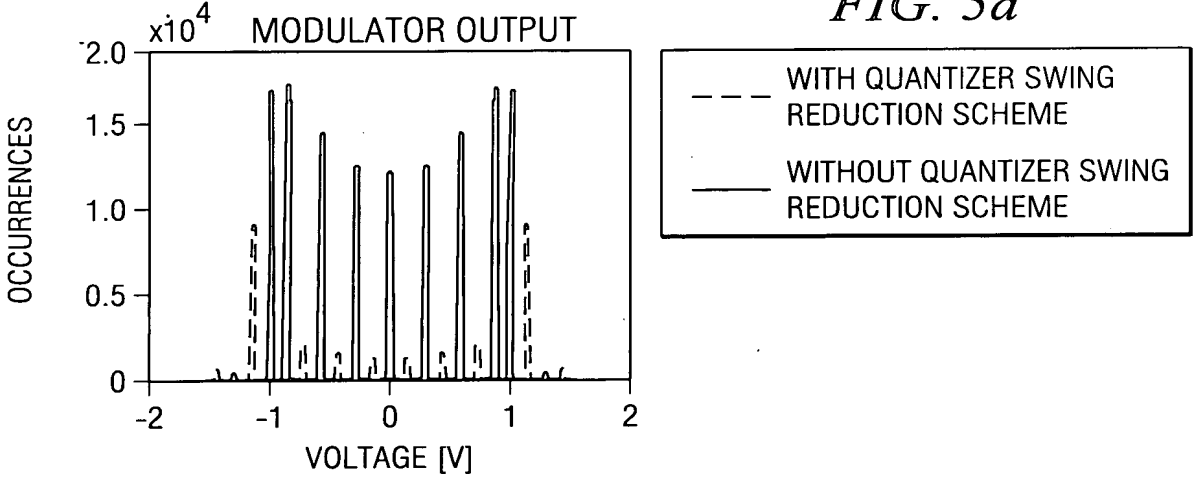


FIG. 7a

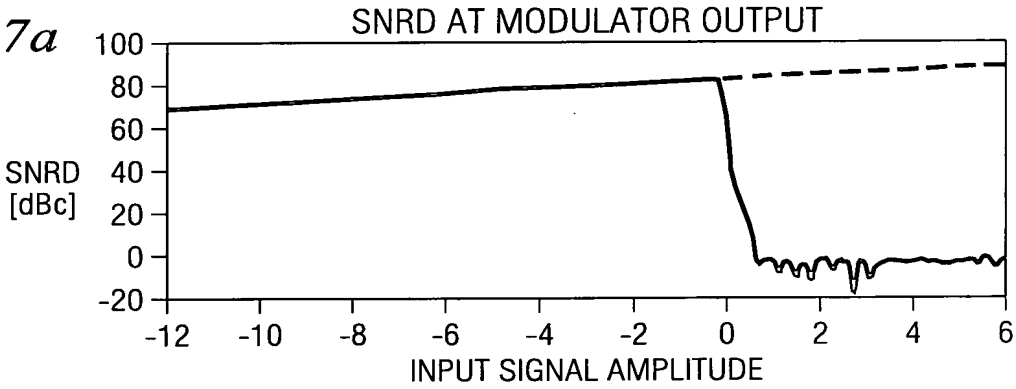


FIG. 7b

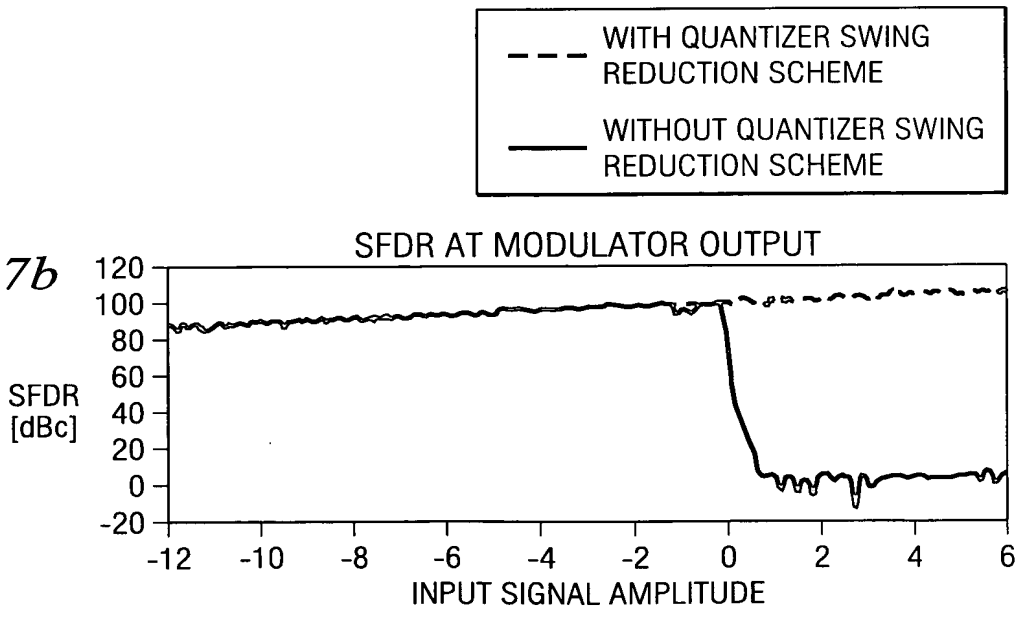
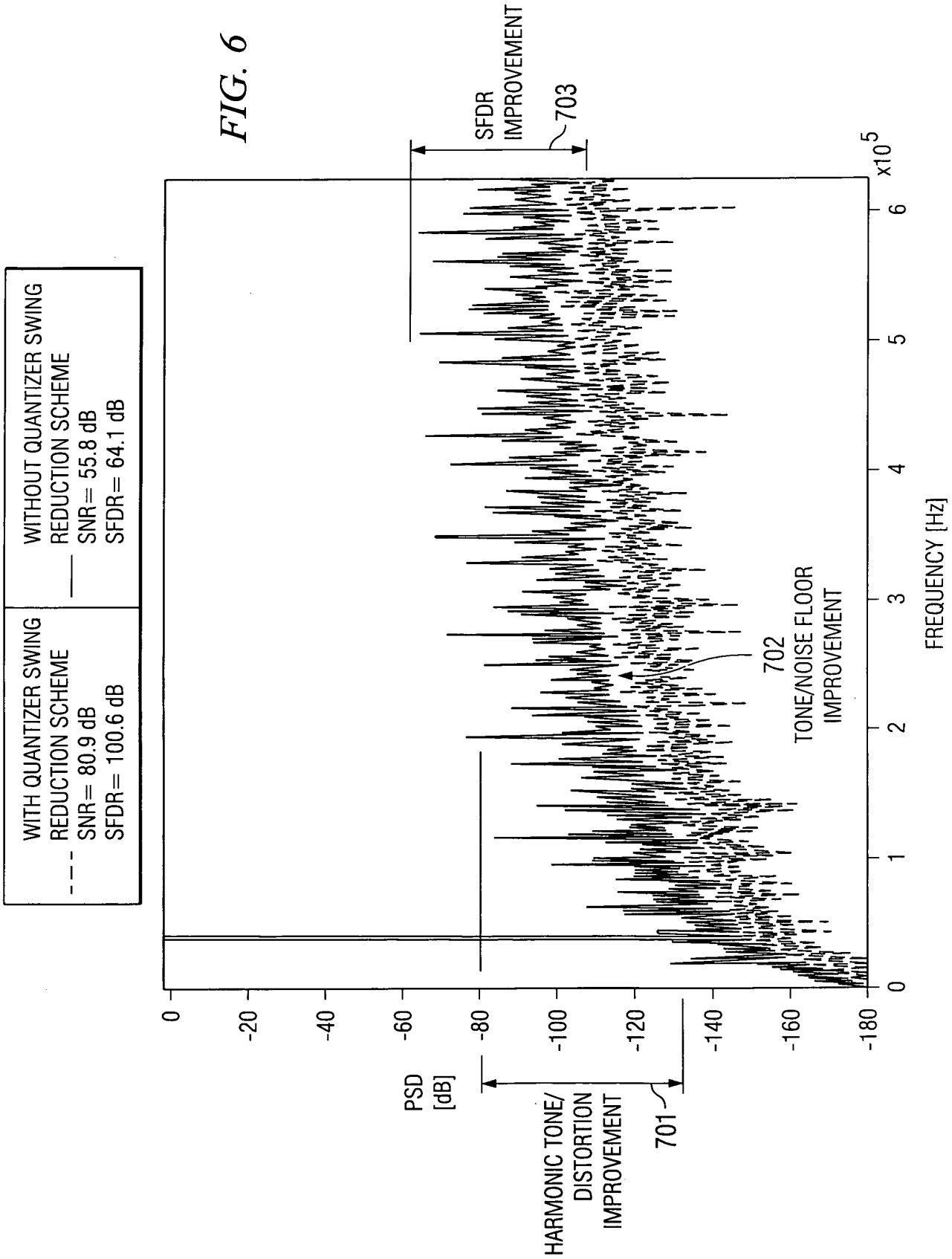


FIG. 6


WITH QUANTIZER SWING
REDUCTION SCHEME
SNR= 80.9 dB
SFDR= 100.6 dB
WITHOUT QUANTIZER SWING
REDUCTION SCHEME
SNR= 55.8 dB
SFDR= 64.1 dB
SFDR
IMPROVEMENT
703
702
TONE/NOISE FLOOR
IMPROVEMENT
HARMONIC TONE/
DISTORTION
IMPROVEMENT
701
PSD
[dB]
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
0
1
2
3
4
5
6
x10^5
FREQUENCY [Hz]

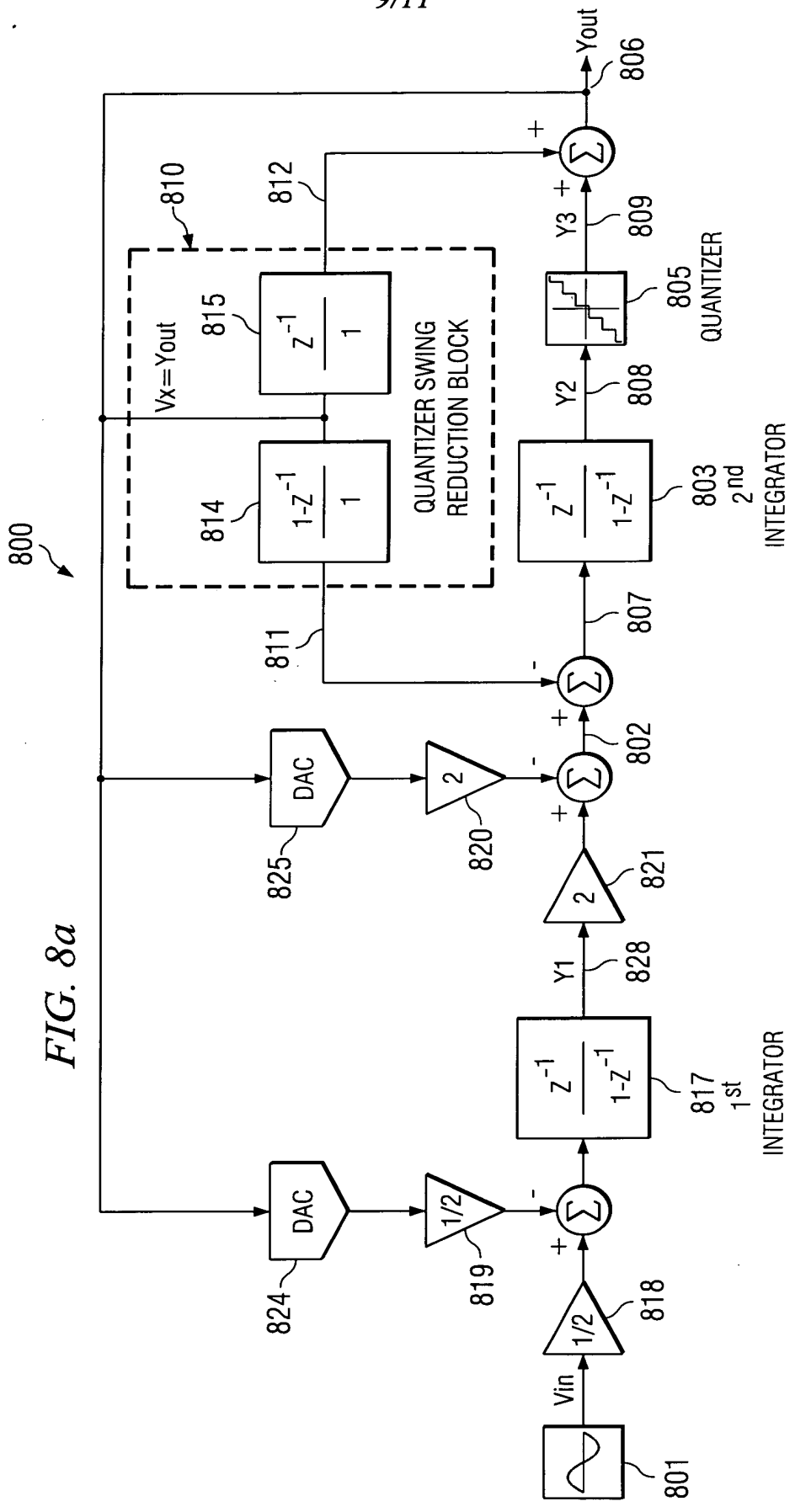

800
801
Vin
1/2
818
DAC
824
1/2
819
817
1st INTEGRATOR
Y1
828
2
821
DAC
825
2
820
802
811
807
803
2nd INTEGRATOR
Y2
808
805
QUANTIZER
Y3
809
Yout
806
812
810
QUANTIZER SWING REDUCTION BLOCK
Vx=Yout
815
814

FIG. 8a

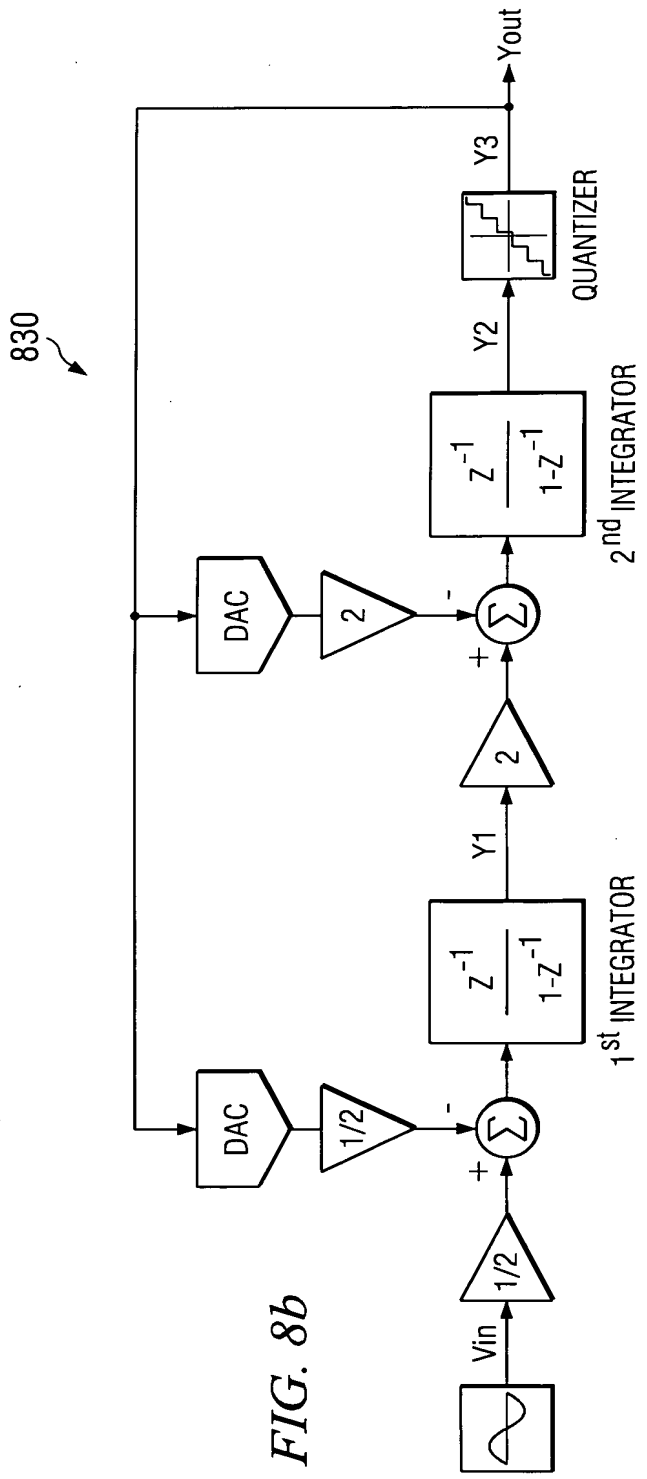

830
Vin
1/2
DAC
1/2
-
+
$\frac{z^{-1}}{1-z^{-1}}$
1st INTEGRATOR
Y1
2
DAC
2
-
+
$\frac{z^{-1}}{1-z^{-1}}$
2nd INTEGRATOR
Y2
QUANTIZER
Y3
Yout

FIG. 8b

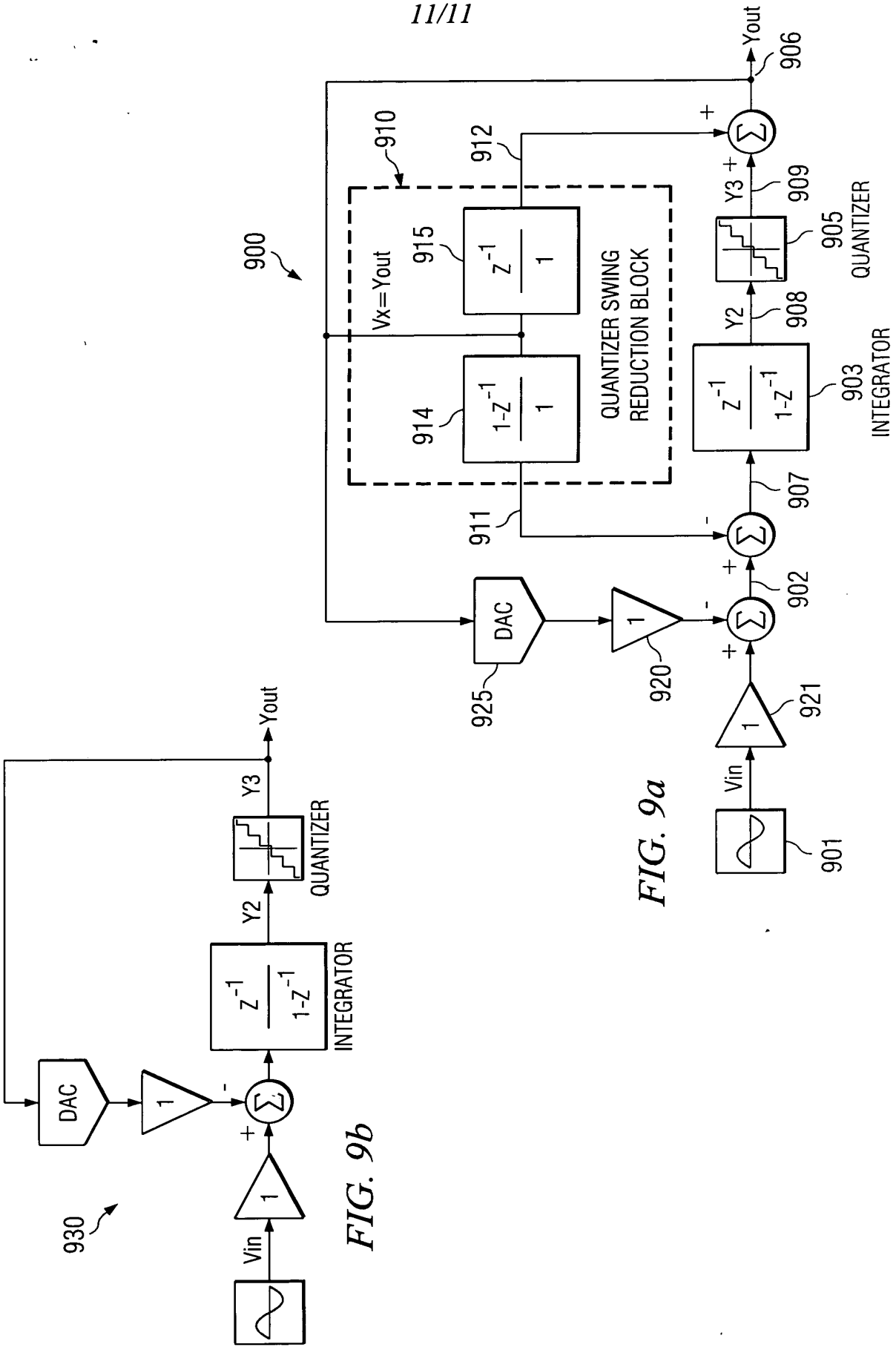

900
910
912
915
914
911
907
902
920
925
921
901
903
INTEGRATOR
905
QUANTIZER
909
908
906
Yout
Vin
Y2
Y3
Vx=Yout
QUANTIZER SWING
REDUCTION BLOCK
DAC
930
INTEGRATOR
QUANTIZER

FIG. 9a

FIG. 9b